

Appendix B

Development of Stack Parameters and Vertical Distributions for Modeling Large Wildfires in the CCOS Domain.

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This document describes the methodology used for vertical distribution of emissions estimates for the wildfires occurring during the CCOS modeling episodes. During the CCOS modeling episode of July 29 – August 3, 2000 two large wildfires occurred in the modeling domain: the July 23-31, 2000 Plaskett fire in Monterey County, and the July 22-August 8, 2000 Manter fire in Tulare County. Daily emissions estimates and related parameters were calculated and provided by ARB for inclusion into the emissions modeling. (Scott K., 2003a, 2003b) These data were then utilized to develop a plume profile, using the techniques outlined in a recent report of the Fire Emissions Joint Forum (FEFJ) of the Western Regional Air Partnership (WRAP) (Air Sciences, 2002). The hourly emissions were assigned based on the following standard profile (all values are taken directly from the FEFJ report):

Hour	1	2	3	4	5	6	7	8	9	10	11	12
%	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	2.0	4.0	7.0
Hour	13	14	15	16	17	18	19	20	21	22	23	24
%	10.0	13.0	16.0	17.0	12.0	7.0	4.0	0.53	0.53	0.53	0.53	0.53

For each hour of the episode, the wildfire virtual acreage was calculated using the fuel loading factors provided by ARB, and the virtual acreage sizes were used to determine to the size classes of the fires. The size classes were then used to determine the parameters required to calculate the plume characteristics:

Class	1	2	3	4	5
Size (virtual acres)	0-10	>=10-100	>=100-1000	>=1000-5000	>=5000
BE (size)	0.4	0.6	0.75	0.85	0.9
Ptop Max (m)	160	2400	6400	7200	8000
Pbot Min (m)	0	300	800	1600	1600

These values, along with the buoyancy efficiency as a function of the hour of the day, were used to calculate the bottom of the plume, the top of the plume, and the proportion of the emissions fumigated into the first layer, for each grid cell in the fire area, and for each hour of the episode.

To model the vertical distribution of the plumes, a series of stack parameters were constructed for each grid cell, and each hour of the episode. The portion of the emissions attributed to the plume, rather than the fumigation layer, was distributed to each of the

stack release points, with the fumigation portion going directly to the first layer (zero plume rise). The stack points were inserted into the emissions model at 25, 75 and 100 meters, and then at every 100 meters up to the top of the plume. Emissions were evenly allocated to each release point, beginning in the layer corresponding to the bottom of the plume, and continuing to the top of the plume.

References

Air Sciences, Inc. 2002. 1996 Fire Emissions Inventory. Draft Final Report. Lakewood, CO. On-line link:

http://www.wrapair.org/forums/FEJF1/emissions/FEJF1996EIReport_021208.pdf

Scott, K. 2003a. Emissions estimates for the July-August 2000 Manter Fire. Technical Memorandum, ARB-PTSD

Scott, K. 2003b. Emissions estimates for the July 23-31 2000 Plaskett2 Fire. Technical Memorandum, ARB-PTSD